DOCUMENT RESUME

ED 377 225 TM 022 399

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TITLE Classroom Characteristics Related to Ethnic Achievement Gap Reduction.
PUB DATE Apr 92
NOTE 30p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, April 20-24, 1992).
PUB TYPE Reports - Research/Technical (143) -- Statistical Data (110) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement; Achievement Gains; *Classroom Environment; Classroom Observation Techniques; Elementary Education; *Elementary School Students; Elementary School Teachers; *Ethnic Groups; Institutional Characteristics; Interaction; Language Arts; Mathematics; Reading; School Districts; Teacher Effectiveness; *Time on Task
IDENTIFIERS California Achievement Tests; *Gap Reduction Model; *Seattle Public Schools WA

ABSTRACT

Problems involved in reducing the achievement gap among ethnic groups in the Seattle (Washington) public schools were studied. An 11-member team selected 25 elementary schools and 216 classrooms for the study, which included classroom observations, teacher questionnaires, and measurement of ethnic achievement gap reduction through California Achievement Test scores. Achievement test results and analysis suggest that the ethnic achievement gap is more directly modifiable by school and classroom practices than is overall achievement level. In the intermediate grades, findings suggest that the optimal setting for reading gap reduction is a classroom with considerable one-on-one interactive instruction. A similar situation fosters mathematics gap reduction, although language gap reduction suggests that situations in which the teacher interacts with the whole class are beneficial. At the primary level, the best setting for gap reduction appears to be a classroom in which students can wander off task, but in which they must remain in their seats. Off-task behavior may be a form of active and productive cognitive processing in "play." Seven tables present study findings. (Contains 23 references.) (SLD)

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CLASSROOM CHARACTERISTICS RELATED TO ETHNIC ACHIEVEMENT GAP REDUCTION

Madelaine Ramey

Seattle Public Schools

Paper presented at the annual meeting of the
American Education Research Association, San Franciso, April 1992

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CLASSROOM CHARACTERISTICS RELATED TO ETHNIC ACHIEVEMENT GAP REDUCTION

As Gastright (1987) observed five years ago, the achievement gap between ethnic minority and majority students has been in a 20-year-old state of limbo as a research topic. Gastright attributed this state of affairs to studies such as those of Coleman et al. (1966) and Jensen (1969), which concluded that differences in student achievement are due primarily to family background and associated variables. The impact of these conclusions has apparently been to discourage interest in research on reducing the achievement gap.

School systems are, however, confronted daily with the issue as well as indications that it can be successfully addressed. This fact of school system life has prompted the present study, which addresses the problem of reducing the ethnic achievement gap. The study consists of three steps:

(1) compute a measure of achievement gap reduction,

(2) identify those classroom practices that correlate with the measure, and

(3) try to figure out why these practices work.

The fourth step is beyond the scope but is a desired outcome of this effort. It is to use the findings as a basis for future more deliberate efforts to reduce the ethnic achievement gap.

Method

Measurement of School Characteristics

Identification and measurement of school characteristics that are likely predictors of ethnic achievement gap reduction took place over a decade before the present study. The activities occurred in 1981-82 as part of a validation study conducted in the Seattle School District. Validation efforts centered on a measure of school contribution to elementary students' achievement growth (Ramey, Hillman, & Matthews, 1982).

An 11-member team composed of teachers, principals, curriculum specialists, evaluators, and central administrators oversaw the study's conduct. Team members decided which school characteristics would be examined and how they would be measured. Team members also randomly selected 25 of the District's 67 schools as targets for study. Measurements described below were collected in 216 classrooms within these 25 schools. They were obtained from classroom observations and teacher questionnaire responses.

Grades (two through six) within schools formed the units of analysis in both the initial and the present research. Thus this study involves 36 cases at the primary level (19 second and 17 third grades) and 47 cases at the intermediate level (17 fourth, 18 fifth, and 12 sixth grades). Experience with these and similar data led to the decision to analyze primary and intermediate cases separately.

Classroom observations. See Ramey (1984) for a description of the observation protocol and procedures for its use. Variables derived from the observations fall into two categories, student activities and teacher activities.

Student Activities	Teacher Activities
Average percent of student time spent in:	Percent of teacher time spent in:
academically engaged behavior	interactive instruction
one-to-one setting with teacher	lecture
small group setting with teacher	one-to-one interaction
total group setting with teacher	small group interaction
seatwork	total group interaction
other activities related to subject being taught	organization
other activities not related to subject being taught	discipline
being tested	monitoring
	noninteractive activity

Teacher questionnaire. The teacher questionnaire assessed eight dimensions:

(1) Principal as a personnel manager
(2) Principal as an academic leader
(3) Teacher's expectations for students
(4) Usefulness of district curriculum
(5) Building climate
(6) Effectiveness of building's instructional program
(7) Coordination among building's programs
(8) Clarity of definition and consistency of building's standards for instruction and conduct

See Ramey (1983) for an annotated copy, and a description of the measurement properties, of the questionnaire.

Measurement of Ethnic Achievement Gap Reduction

The author used California Achievement Test (CAT) score
from fall 1981 and spring 1982 administrations to compute a
measure of ethnic achievement gap reduction for each of the
District's 67 elementary schools. Computations consisted of
three steps:

1. Compute average fall 1981 and average spring 1982 CA
   scores separately for minority and majority students
   each grade (two through six) in Total Reading, Total
   and Total Language for each elementary school.[1]

2. Save residuals obtained from regressing schools' spr
   1982 difference between ethnic group means on school
   fall 1981 difference between ethnic group means for
   subject and each grade.

3. Divide each residual score by its standard error to
   produce what is hereafter called a gap reduction ind

The statistical rationale for this procedure rests on its
similarity to that used in generating indexes of overall sch
effectiveness (Mandeville & Anderson, 1987; Ramey, 1987). T
latter, called school effectiveness indexes (SEIs), are comp
using residuals from regressing schools' spring average
achievement test scores on their preceding fall (or spring)
average achievement test scores. O'Connor (1972) showed tha
school's SEI is an unbiased estimate of its contribution to
achievement in that subject and grade.[2]

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[1] In this application, White and Asian students comprised th
majority while Black, Native American, and Hispanic studen
comprised the minority group. The reason for this
configuration was that it produced the largest achievement
pretest gaps.

[2] Seltzer (1987) showed that multiplying the SEI, a least
squares residual, by the appropriate school level reliabil
term converts it to an Empirical Bayes residual, which is
efficient as well as unbiased (Raudenbush & Bryk, 1989).
However, unless the school level reliability terms differ
considerably from one school to another, the two least squ
and the Empirical Bayes residuals yield nearly identical
school rankings. In this application, the school level
reliabilities were nearly equal.

Analysis

The author used Linear Structural Relations analysis, LISREL VI (Joreskog and Sorbom, 1981), to model the relationship between predictor (classroom observation and teacher questionnaire response) variables and outcomes, degree of gap reduction in reading, math and language. LISREL was chosen over multiple regression analysis because it "recognizes" unreliability in the predictor variables. That is, it partitions variances and covariances into "true" and "error" components and uses only the "true" part of the variable to predict an outcome.

A data reduction stage preceded the LISREL analysis. Data reduction involved examining correlations among the 17 observation and eight questionnaire variables by means of simple inspection and factor analysis. The examination indicated a high degree of collinearity among variables within both the observation and questionnaire data sets.

Data reduction activities suggested retention of only eight of the observation and one of the questionnaire variables, at the intermediate elementary level. At the primary level, only four observation variables were retained.

Results

Intermediate Grades

Table 1 shows the correlations, for the 4th through 6th grade sample, among the variables selected as predictors of reading, mathematics, and/or language gap reduction. Fourth through sixth grade cases' scores on the same variables comprise Tables 2 (reading), 3 (mathematics), and 4 (language). In Tables 2, 3, and 4, cases are labeled in descending order of reading gap reduction index.

Intermediate reading. Those variables that appeared most predictive of intermediate reading gap reduction are:

- percent of teacher time spent one-to-one with students
- percent teacher time spent in organization activities
- percent teacher time spent in interactive instruction
- average percent of student time spent in activities related to subject being taught

Inspection of Table 2 prompted the hypothesis of a curvilinear relationship between amount of interactive instruction and reading gap reduction; i.e., that there might be some optimal range of interactive instruction below which is not enough and above which is too much. Indeed, adding a squared

term in the interactive instruction variable increased the amount of variance explained over that explained with only a linear term in the variable.

Together, these variables accounted for 45.1% of the variance in the gap reduction index for intermediate reading achievement. These findings suggest that the optimal setting for reading gap reduction is a classroom with a considerable amount of one-on-one interactive instruction and substantial time spent organizing to keep other children involved in reading-related activities.

Intermediate math. Those variables found most predictive of intermediate math gap reduction are:

- average percent of student time spent in seatwork
- percent teacher time spent interacting with whole class
- percent teacher time spent on discipline
- teachers' perception of usefulness of district curriculum (negative relationship)

These variables accounted for 47.4% of the variance in the gap reduction index for mathematics achievement. These findings suggest that the optimal setting for math gap reduction is a well-disciplined classroom in which the teacher continues to interact with students as they work at their seats; teachers' negative perception of district curriculum suggests that seatwork assignments are teacher-developed.

Intermediate language. Those variables found most predictive of intermediate language gap reduction are:

- percent teacher time spent interacting with whole class
- percent teacher time spent in organization activities
- average percent of student time spent being tested (negative relationship)
- teachers' perception of usefulness of district curriculum (negative relationship)

These variables accounted for 46.4% of the variance in the gap reduction index for language achievement. These findings suggest that best results, for language gap reduction, are obtained in settings where the teacher interacts with the entire class through structured (nontest) activities, materials for which are teacher-developed.

Primary grades

Table 5 shows the correlations, for the 2nd and 3rd grade sample, among the variables selected as predictors of reading and mathematics gap reduction. (Language gap indexes were not computed because 2nd grade students had no language pretest.) Second and third grade cases' scores on the same variables

comprise Tables 6 (reading) and 7 (mathematics). In Tables 6 and 7, cases are labeled in descending order of reading gap reduction index.

The variables found most predictive of reading gap reduction are the same as for math gap reduction:

- average percent of student time spent in seatwork
- average percent of student time spent "off task"; i.e., on activities not related to subject being taught
- percent teacher time spent in lecture (negative relationship)
- average percent of student time spent being tested (negative relationship)

These variables accounted for 43.6% and 50.1% of the variance in the gap reduction index for reading and math achievement respectively. Taken together, these findings suggest that the best setting for gap reduction at the primary level is a classroom permissive enough to allow students' attention to wander off task but disciplined enough to require that they remain in their seats. The finding that "off-taskness" promotes achievement in younger minority students was a surprise; its implications are touched on in the discussion section of this paper.

Discussion

Three aspects of the foregoing seem particularly noteworthy: (1) the large amount of variance "explained" in the gap reduction measure at both grade levels, (2) the differences in what promotes reading, math, and language gap reduction at the intermediate grade level, and (3) the finding that more off-task behavior narrows the gap at the primary level.

Variance explained

As Bobbett, French, and Achilles (1991) noted, accounting for more than 25% of the variance in an achievement-related outcome is a rare research event. In fact, we had been pleased to find that school and classroom variables accounted for 26.6, 20.4, and 16.2 percent of the variance in intermediate reading, math, and language achievement growth indices, respectively (Ramey, 1987).

Here, using the same set of school and classroom variables, but a different--perhaps more important--outcome measure, we accounted for about twice as much variance. For reading, variance accounted for is 45.1% compared with 26.1%; for math, it is 47.4% versus 20.4%; and for language, 46.4% versus 16.2%. It seems reasonable to conclude that, since changes in it are more predictable, the ethnic achievement gap is more directly

modifiable by school and classroom practices than is overall achievement level.

Intermediate subject predictors

Pieced together, the research literature supports the finding of differences in what promotes reading, math, and language gap reduction. Garner's (1990) review suggests that different settings or contexts promote different learning strategies. Since different strategies are optimal for different kinds (e.g., reading vs. math) of learning, different settings are likewise optimal for different kinds of learning.

Good, Grouws, Mason, Slavings, and Cramer (1990) found for mathematics instruction that group structure (whole-class versus small group) and teaching function (review, seatwork, etc.) affected a number of individual and group behaviors. These behaviors included group interaction, self-management, cooperation, use of manipulatives, and high-level cognitive activities.

It is likely too that different settings, and the teaching practices "embedded" in them, are differentially effective with different students. Brophy's (1979) study of teacher behavior effects and Medley's (1977) review of "process-product" research show this kind of interaction between teaching practices and student socioeconomic status.

Morine-Dershimer (1983) observed that different instructional strategies give "status" to different groups of students. Strategies that place more importance on pupil ideas than on textual information, for which the teacher gives praise of a specific nature, involving classroom tasks that require higher order (analytical or evaluative) divergent thinking (risk taking) give status to students who are not typically accorded status, i.e. lower achieving students.

The foregoing implies that flexibility in grouping students is important. Blair (1984) described seven characteristics of good teachers; that is, teachers who improve student learning. One characteristic is flexible grouping. In terms of the current study, we would expect that classrooms (such as those represented by cases 3I and 7I in Tables 2 through 4) with high gap reduction indexes in both reading and math (and language) use flexible grouping. Since flexible grouping was not defined nor measured during the study, we can only surmise that it was occurring.

We can also only surmise that efficient transitions were also occurring in classrooms with high gap reduction indexes in both reading and math. We would expect, along with Arlin (1979) that structured transitions characterize classrooms like those

represented by cases 3I and 7I in Tables 2 through 4.

Primary grades off-task behavior

Two questions suggest themselves concerning the finding that more off-task behavior narrows the gap at the primary level. The first question is, "Is the off-task behavior a form of playing?" Piaget (1962) observed that young children need to play because play allows them to incorporate new experience into existing mental schemata. Sylva, Bruner and Genova (1976) noted that play children (those exposed to a prior play experimental setting) were more productive and organized in problem-solving, more self-initiated and more goal-directed because play reduced frustration and fear of failure; i.e., prior play shifted emphasis from end to means.

The second question is, "Is this play of a make-believe nature?" Christie and Johnsen (1983) cited research showing lower frequencies of make-believe in the play of low SES children. If low SES is equivalent to ethnic minority, as it is in at least one study cited by Christie & Johnsen, then it would follow that providing opportunity for disadvantaged children to engage in this kind of play gives them a "leg up," compared with minority children who don't have the opportunity to "make believe."

The results suggest that primary students' off-task behavior is a form of play in which active and productive cognitive processing occurs. In the case of young minority students, off-task time may be among the few times that permit such a luxury.

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TABLE 1

MATRIX OF CORRELATIONS AMONG INDEX SCORES AND
SCHOOL CHARACTERISTIC VARIABLES, GRADES 4 THROUGH 6

	Reading Gap Reduction	Math Gap Reduction	Language Gap Reduction	Percent Teacher Time One to One	Percent Teacher Time in Organization Activities	Percent Teacher Time in Interactive Instruction	Avg Percent Student Time in Related Activities	Percent Teacher Time in Whole Class Activities	Percent Teacher Time in Discipline Activities	Teacher Perceived Usefulness of District Curriculum	Avg Percent Student Time in Seatwork	Avg Percent Student Time being Tested
Reading Gap Reduction	1.00	.46	.30	.22	.23	-.24	.41	.01	.15	-0.07	.19	.01
Math Gap Reduction		1.00	.31	.08	.07	-.07	.04	.01	.25	-0.27	.29	-.08
Language Gap Reduction			1.00	-.08	.27	-.03	.07	-.03	.14	-0.35	.02	-.36
Percent Teacher Time One to One				1.00	-.49	.33	.27	-.63	.02	-0.07	.44	-.04
Percent Teacher Time, Organization					1.00	-.64	-.10	.43	.14	0.07	-.14	-.02
Percent Teacher Time, Interact Instr						1.00	-.08	-.46	-.05	0.01	-.03	-.48
Avg Percent Student Time, Rel Activities							1.00	-.27	.18	-0.37	.10	.02
Percent Teacher Time, Whole Class								1.00	.01	-0.01	-.46	.09
Percent Teacher Time, Discipline									1.00	0.03	-.15	-.01
Teacher Perceived Useful, Dist Curric										1.00	.10	.07
Avg Percent Student Time, Seatwork											1.00	-.12
Standard Deviation	0.8	1.0	0.9	0.7	5.7	19.6	1.5	20.2	2.5	0.9	13.6	6.2
Reliability				.80	.80	.86	.80	.80	.80	.81	.80	.80

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TABLE 2

READING GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 4 THROUGH 6

CASE	READING GAP REDUCTION	PERCENT TEACHER TIME ONE TO ONE	PERCENT TEACHER TIME IN ORGANIZATION ACTIVITIES	PERCENT TEACHER TIME IN INTERACTIVE INSTRUCTION	AVG PERCENT STUDENT TIME IN RELATED ACTIVITIES
1I	2.23	33.5	11.2	35.1	4.2
2I	1.48	43.1	3.5	74.5	0.0
3I	1.10	24.6	10.4	52.3	1.9
4I	1.02	17.9	12.1	64.9	5.2
5I	.80	7.2	19.8	64.7	0.0
6I	.79	0.0	10.8	50.0	0.0
7I	.79	14.3	24.7	19.4	.4
8I	.75	47.9	5.0	81.5	4.1
9I	.74	12.0	18.7	30.5	.4
10I	.45	3.6	18.2	57.4	0.0
11I	.43	30.9	9.3	50.3	0.0
12I	.43	10.9	13.8	44.9	2.5
13I	.38	20.5	12.5	67.6	1.7
14I	.37	28.6	9.7	59.4	.5
15I	.22	31.6	9.9	68.2	.7
16I	.16	36.8	7.9	68.9	.8
17I	.15	14.8	9.4	43.4	5.9
18I	.08	13.4	12.5	64.9	.2
19I	.06	30.7	2.9	61.0	.5
20I	.05	0.0	20.0	63.6	0.0
21I	.03	25.2	8.6	56.0	.5
22I	-.25	7.3	8.7	16.3	1.0
23I	-.46	9.7	19.0	21.5	.6
24I	-.49	2.5	12.4	63.4	0.0
25I	-.52	17.0	19.5	30.4	1.1
26I	-.57	17.9	10.4	49.3	.9
27I	-.57	20.2	7.6	66.3	0.0
28I	-.61	14.7	14.0	45.6	0.0
29I	-.67	17.9	12.5	68.4	.3
30I	-.88	15.6	15.5	55.7	0.0
31I	-.89	43.3	4.8	87.4	1.1
32I	-1.00	30.2	8.5	72.1	.1
33I	-1.10	15.0	1.0	91.4	.3
34I	-1.10	4.2	12.7	32.0	0.0
35I	-1.20	34.1	5.3	69.6	1.3
36I	-1.40	0.0	0.0	98.0	0.0

TABLE 3

MATHEMATICS GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 4 THROUGH 6

CASE	MATH GAP REDUCTION	PERCENT TEACHER TIME WHOLE CLASS	PERCENT TEACHER TIME IN DISCIPLINE ACTIVITIES	TEACHER PERCEIVED USEFULNESS OF DISTRICT CURRICULUM	AVG PERCENT STUDENT TIME IN SEATWORK
6I	1.61	100.0	0.0	15.0	42.3
3I	1.59	64.1	12.0	14.9	18.5
7I	1.44	85.7	7.9	14.5	57.4
13I	1.39	56.8	5.9	14.9	19.6
16I	1.20	27.7	.8	14.9	48.6
1I	.82	65.3	1.3	14.6	39.5
17I	.72	64.5	.9	12.5	41.3
14I	.71	68.4	2.4	12.5	19.8
5I	.67	92.8	1.8	14.6	10.6
10I	.63	84.6	1.2	14.4	23.5
24I	.45	81.9	3.2	14.7	21.3
2I	.40	56.9	0.0	15.2	54.9
28I	.39	77.2	4.8	14.7	20.4
12I	.27	79.5	1.7	14.6	29.8
22I	.19	92.6	1.5	14.5	26.5
33I	.16	18.2	2.4	15.2	60.2
11I	.15	69.1	0.0	14.4	32.7
26I	.03	69.3	1.2	12.5	25.0
8I	-.09	32.5	3.1	14.1	36.3
20I	-.12	61.1	1.4	14.6	14.5
21I	-.18	55.3	3.0	15.5	32.7
25I	-.26	83.0	2.2	14.4	35.2
27I	-.32	40.4	.4	14.9	36.1
29I	-.53	56.8	.9	14.0	37.8
31I	-.57	37.1	0.0	14.9	45.9
32I	-.65	69.8	1.2	14.9	22.9
15I	-.72	55.1	2.4	15.2	47.3
19I	-.72	62.5	1.5	14.1	19.3
35I	-.79	64.6	5.7	15.5	34.6
18I	-1.10	80.0	4.0	15.5	21.4
30I	-1.20	82.8	1.4	14.6	18.1
9I	-1.20	88.0	0.0	16.5	36.2
36I	-1.40	100.0	2.0	15.2	0.0
23I	-1.90	51.1	.8	16.5	25.7
34I	-2.10	90.1	1.5	14.6	21.3
4I	-2.20	49.3	5.1	14.1	18.1

TABLE 4

LANGUAGE GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 4 THROUGH 6

CASE	LANGUAGE GAP REDUCTION	PERCENT TEACHER TIME WHOLE CLASS	PERCENT TEACHER TIME IN ORGANIZATION ACTIVITIES	AVG PERCENT STUDENT TIME BEING TESTED	TEACHER PERCEIVED USEFULNESS OF DISTRICT CURRICULUM
20I	1.95	61.1	20.0	0.0	14.6
7I	1.94	85.7	24.7	0.0	14.5
12I	1.34	79.5	13.8	0.0	14.6
10I	1.23	84.6	18.2	2.6	14.4
14I	.84	68.4	9.7	0.0	12.5
17I	.73	64.5	9.4	5.0	12.5
15I	.68	55.1	9.9	6.3	15.2
8I	.67	32.5	5.0	0.0	14.1
34I	.56	90.1	12.7	3.7	14.6
11I	.47	69.1	9.3	0.0	14.4
28I	.45	77.2	14.0	9.2	14.7
5I	.37	92.8	19.8	0.0	14.6
3I	.34	64.1	10.4	7.9	14.9
24I	.30	81.9	12.4	0.0	14.7
32I	.28	69.8	8.5	0.0	14.9
33I	.17	18.2	1.0	0.0	15.2
4I	.10	49.3	12.1	0.0	14.1
2I	.09	56.9	3.5	0.0	15.2
19I	.05	62.5	2.9	24.7	14.1
21I	-.01	55.3	8.6	2.9	15.5
27I	-.01	40.4	7.6	3.7	14.9
26I	-.10	69.3	10.4	4.0	12.5
1I	-.11	65.3	11.2	6.8	14.6
16I	-.17	27.7	7.9	3.2	14.9
6I	-.44	100.0	10.8	0.0	15.0
13I	-.76	56.8	12.5	8.4	14.9
23I	-.81	51.1	19.0	13.8	16.5
36I	-.93	100.0	0.0	.6	15.2
29I	-1.00	56.8	12.5	4.6	14.0
9I	-1.20	88.0	18.7	10.7	16.5
18I	-1.30	80.0	12.5	0.0	15.5
35I	-1.30	64.6	5.3	0.0	15.5
31I	-1.30	37.1	4.8	0.0	14.9
25I	-1.40	83.0	19.5	11.4	14.4
22I	-1.70	92.6	8.7	22.4	14.5
30I	.	82.8	15.5	0.0	14.6

TABLE 5

MATRIX OF CORRELATIONS AMONG INDEX SCORES AND SCHOOL CHARACTERISTIC VARIABLES, GRADES 2 AND 3

	Reading Gap Reduction	Math Gap Reduction	Avg Percent Student Time in Seatwork	Avg Percent Student Time Off Task	Percent Teacher Time Lecturing	Avg Percent Student Time being Tested
Reading Gap Reduction	1.00	.42	.36	.34	-.29	-.29
Math Gap Reduction		1.00	.29	.13	-.23	-.51
Avg Percent Student Time, Seatwork			1.00	.20	.15	-.28
Avg Percent Student Time, Off Task				1.00	-.14	.01
Percent Teacher Time, Lecturing					1.00	-0.15
Standard Deviation	1.0	1.0	12.1	2.4	3.5	9.9
Reliability			.80	.79	.80	.80

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TABLE 6

READING GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 2 AND 3

CASE	READING GAP REDUCTION	AVG PERCENT STUDENT TIME IN SEATWORK	AVG PERCENT STUDENT TIME OFF TASK	PERCENT TEACHER TIME LECTURING	AVG PERCENT STUDENT TIME BEING TESTED
1P	1.98	27.2	2.0	0.0	0.0
2P	1.26	37.9	.3	.5	1.6
3P	1.15	49.6	1.9	0.0	0.0
4P	.89	35.7	4.3	0.0	4.3
5P	.63	44.5	.4	3.1	1.7
6P	.52	34.5	4.9	1.4	0.0
7P	.43	45.1	1.0	2.1	0.0
8P	.32	39.7	10.2	0.0	10.5
9P	.02	20.7	0.0	0.0	0.0
10P	-.18	43.9	.1	.6	0.0
11P	-.22	24.0	6.0	2.2	0.0
12P	-.27	39.5	0.0	0.0	0.0
13P	-.31	28.7	0.0	1.0	0.0
14P	-.49	1.4	.1	0.0	0.0
15P	-.51	25.0	2.1	0.0	10.0
16P	-.53	20.1	0.0	0.0	0.0
17P	-.60	32.6	2.4	0.0	0.0
18P	-.70	23.2	.8	0.0	0.0
19P	-.75	37.3	1.4	0.0	0.0
20P	-.80	43.1	1.5	0.0	0.0
21P	-.90	19.8	.8	6.7	0.0
22P	-1.20	15.7	0.0	0.0	5.3
23P	-1.40	45.4	.2	3.7	0.0
24P	-1.40	17.7	0.0	0.0	48.9
25P	-1.40	37.6	0.0	16.7	0.0
26P	-1.40	13.0	0.0	0.0	10.5

TABLE 7

MATHEMATICS GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 2 AND 3

CASE	MATH GAP REDUCTION	AVG PERCENT STUDENT TIME IN SEATWORK	AVG PERCENT STUDENT TIME OFF TASK	PERCENT TEACHER TIME LECTURING	AVG PERCENT STUDENT TIME BEING TESTED
3P	1.96	49.6	1.9	0.0	0.0
12P	1.53	39.5	0.0	0.0	0.0
16P	1.35	20.1	0.0	0.0	0.0
5P	.87	44.5	.4	3.1	1.7
4P	.65	35.7	4.3	0.0	4.3
19P	.64	37.3	1.4	0.0	0.0
2P	.34	37.9	.3	.5	1.6
22P	.34	15.7	0.0	0.0	5.3
8P	.23	39.7	10.2	0.0	10.5
6P	.06	34.5	4.9	1.4	0.0
9P	.03	20.7	0.0	0.0	0.0
17P	.02	32.6	2.4	0.0	0.0
13P	-.04	28.7	0.0	1.0	0.0
7P	-.16	45.1	1.0	2.1	0.0
11P	-.21	24.0	6.0	2.2	0.0
18P	-.26	23.2	.8	0.0	0.0
14P	-.27	1.4	.1	0.0	0.0
21P	-.33	19.8	.8	6.7	0.0
15P	-.62	25.0	2.1	0.0	10.0
10P	-.75	43.9	.1	.6	0.0
20P	-.81	43.1	1.5	0.0	0.0
25P	-1.10	37.6	0.0	16.7	0.0
1P	-1.20	27.2	2.0	0.0	0.0
23P	-1.30	45.4	.2	3.7	0.0
26P	-1.40	13.0	0.0	0.0	10.5
24P	-2.50	17.7	0.0	0.0	48.9

TABLE 1

MATRIX OF CORRELATIONS AMONG INDEX SCORES AND SCHOOL CHARACTERISTIC VARIABLES, GRADES 4 THROUGH 6

	Reading Gap Reduction	Math Gap Reduction	Language Gap Reduction	Percent Teacher Time One to One	Percent Teacher Time in Organization Activities	Percent Teacher Time in Interactive Instruction	Avg Percent Student Time in Related Activities	Percent Teacher Time in Whole Class Activities	Percent Teacher Time in Discipline Activities	Teacher Perceived Usefulness of District Curriculum	Avg Percent Student Time in Seatwork	Avg Percent Student Time being Tested
Reading Gap Reduction	1.00	.46	.30	.22	.23	-.24	.41	.01	.15	-0.07	.19	.01
Math Gap Reduction		1.00	.31	.08	.07	-.07	.04	.01	.25	-0.27	.29	-.08
Language Gap Reduction			1.00	-.08	.27	-.03	.07	-.03	.14	-0.35	.02	-.36
Percent Teacher Time One to One				1.00	-.49	.33	.27	-.63	.02	-0.07	.44	-.04
Percent Teacher Time, Organization					1.00	-.64	-.10	.43	.14	0.07	-.14	-.02
Percent Teacher Time, Interact Instr						1.00	-.08	-.46	-.05	0.01	-.03	-.48
Avg Percent Student Time, Rel Activities							1.00	-.27	.18	-0.37	.10	.02
Percent Teacher Time, Whole Class								1.00	.01	-0.01	-.46	.09
Percent Teacher Time, Discipline									1.00	0.03	-.15	-.01
Teacher Perceived Useful, Dist Curric										1.00	.10	.07
Avg Percent Student Time, Seatwork											1.00	-.12
Standard Deviation	0.8	1.0	0.9	0.7	5.7	19.6	1.5	20.2	2.5	0.9	13.6	6.2
Reliability				.80	.80	.86	.80	.80	.80	.81	.80	.80

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TABLE 2

READING GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 4 THROUGH 6

CASE	READING GAP REDUCTION	PERCENT TEACHER TIME ONE TO ONE	PERCENT TEACHER TIME IN ORGANIZATION ACTIVITIES	PERCENT TEACHER TIME IN INTERACTIVE INSTRUCTION	AVG PERCENT STUDENT TIME IN RELATED ACTIVITIES
1I	2.23	33.5	11.2	35.1	4.2
2I	1.48	43.1	3.5	74.5	0.0
3I	1.10	24.6	10.4	52.3	1.9
4I	1.02	17.9	12.1	64.9	5.2
5I	.80	7.2	19.8	64.7	0.0
6I	.79	0.0	10.8	50.0	0.0
7I	.79	14.3	24.7	19.4	.4
8I	.75	47.9	5.0	81.5	4.1
9I	.74	12.0	18.7	30.5	.4
10I	.45	3.6	18.2	57.4	0.0
11I	.43	30.9	9.3	50.3	0.0
12I	.43	10.9	13.8	44.9	2.5
13I	.38	20.5	12.5	67.6	1.7
14I	.37	28.6	9.7	59.4	.5
15I	.22	31.6	9.9	68.2	.7
16I	.16	30.8	7.9	68.9	.6
17I	.15	14.8	9.4	43.4	5.9
18I	.08	13.4	12.5	64.9	.2
19I	.06	30.7	2.9	61.0	.5
20I	.05	0.0	20.0	63.6	0.0
21I	.03	25.2	8.6	56.0	.5
22I	-.25	7.3	8.7	16.3	1.0
23I	-.46	9.7	19.0	21.5	.6
24I	-.49	2.5	12.4	63.4	0.0
25I	-.52	17.0	19.5	30.4	1.1
26I	-.57	17.9	10.4	49.3	.9
27I	-.57	20.2	7.6	66.3	0.0
28I	-.61	14.7	14.0	45.6	0.0
29I	-.67	17.9	12.5	68.4	.3
30I	-.88	15.6	15.5	55.7	0.0
31I	-.89	43.3	4.8	87.4	1.1
32I	-1.00	30.2	8.5	72.1	.1
33I	-1.10	15.6	1.0	91.4	.3
34I	-1.10	7.2	12.7	32.0	0.0
35I	-1.20	34.1	5.3	69.6	1.3
36I	-1.40	0.0	0.0	98.0	0.0

TABLE 3

MATHEMATICS GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 4 THROUGH 6

CASE	MATH GAP REDUCTION	PERCENT TEACHER TIME WHOLE CLASS	PERCENT TEACHER TIME IN DISCIPLINE ACTIVITIES	TEACHER PERCEIVED USEFULNESS OF DISTRICT CURRICULUM	AVG PERCENT STUDENT TIME IN SEATWORK
6I	1.61	100.0	0.0	15.0	42.3
3I	1.59	84.1	12.0	14.9	18.5
7I	1.44	85.7	7.9	14.5	57.4
13I	1.39	56.8	5.9	14.9	19.6
16I	1.20	27.7	.8	14.9	48.6
1I	.82	65.3	1.3	14.6	39.5
17I	.72	64.5	.9	12.5	41.3
14I	.71	68.4	2.4	12.5	19.8
5I	.67	92.8	1.8	14.6	10.6
10I	.63	84.6	1.2	14.4	23.5
24I	.45	81.9	3.2	14.7	21.3
2I	.40	56.9	0.0	15.2	54.9
28I	.39	77.2	4.8	14.7	20.4
12I	.27	79.5	1.7	14.6	29.8
22I	.19	92.6	1.5	14.5	26.5
33I	.16	18.2	2.4	15.2	60.2
11I	.15	69.1	0.0	14.4	32.7
26I	.03	69.3	1.2	12.5	25.0
8I	-.09	32.5	3.1	14.1	36.3
20I	-.12	61.1	1.4	14.6	14.5
21I	-.18	55.3	3.0	15.5	32.7
25I	-.26	83.0	2.2	14.4	35.2
27I	-.32	40.4	.4	14.9	36.1
29I	-.53	56.8	.9	14.0	37.8
31I	-.57	37.1	0.0	14.9	45.9
32I	-.65	69.8	1.2	14.9	22.9
15I	-.72	55.1	2.4	15.2	47.3
19I	-.72	62.5	1.5	14.1	19.3
35I	-.79	64.6	5.7	15.5	34.6
18I	-1.10	80.0	4.0	15.5	21.4
30I	-1.20	82.8	1.4	14.6	18.1
9I	-1.20	88.0	0.0	16.5	36.2
36I	-1.40	100.0	2.0	15.2	0.0
23I	-1.90	51.1	.8	16.5	25.7
34I	-2.10	90.1	1.5	14.6	21.3
4I	-2.20	49.3	5.1	14.1	18.1

TABLE 4

LANGUAGE GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 4 THROUGH 6

CASE	LANGUAGE GAP REDUCTION	PERCENT TEACHER TIME WHOLE CLASS	PERCENT TEACHER TIME IN ORGANIZATION ACTIVITIES	AVG PERCENT STUDENT TIME BEING TESTED	TEACHER PERCEIVED USEFULNESS OF DISTRICT CURRICULUM
20I	1.95	61.1	20.0	0.0	14.6
7I	1.94	85.7	24.7	0.0	14.5
12I	1.34	79.5	13.8	0.0	14.6
10I	1.23	84.6	16.2	2.6	14.4
14I	.84	68.4	9.7	0.0	12.5
17I	.73	64.5	9.4	5.0	12.5
15I	.68	55.1	9.9	6.3	15.2
8I	.67	32.5	5.0	0.0	14.1
34I	.56	90.1	12.7	3.7	14.6
11I	.47	69.1	9.3	0.0	14.4
28I	.45	77.2	14.0	9.2	14.7
5I	.37	92.8	19.8	0.0	14.6
3I	.34	64.1	10.4	7.9	14.9
24I	.30	81.9	12.4	0.0	14.7
32I	.28	69.8	8.5	0.0	14.9
33I	.17	18.2	1.0	0.0	15.2
4I	.10	49.3	12.1	0.0	14.1
2I	.09	56.9	3.5	0.0	15.2
19I	.05	62.5	2.9	24.7	14.1
21I	-.01	55.3	8.6	2.9	15.5
27I	-.01	40.4	7.6	3.7	14.9
26I	-.10	69.3	10.4	4.0	12.5
1I	-.11	65.3	11.2	6.8	14.6
16I	-.17	27.7	7.9	3.2	14.9
6I	-.44	100.0	10.8	0.0	15.0
13I	-.76	56.8	12.5	8.4	14.9
23I	-.81	51.1	19.0	13.8	16.5
36I	-.93	100.0	0.0	.6	15.2
29I	-1.00	56.8	12.5	4.6	14.0
9I	-1.20	88.0	18.7	10.7	16.5
18I	-1.30	80.0	12.5	0.0	15.5
35I	-1.30	64.6	5.3	0.0	15.5
31I	-1.30	37.1	4.8	0.0	14.9
25I	-1.40	83.0	19.5	11.4	14.4
22I	-1.70	92.6	8.7	22.4	14.5
30I	.	82.8	15.5	0.0	14.6

TABLE 5

MATRIX OF CORRELATIONS AMONG INDEX SCORES AND SCHOOL CHARACTERISTIC VARIABLES, GRADES 2 AND 3

	Reading Gap Reduction	Math Gap Reduction	Avg Percent Student Time in Seatwork	Avg Percent Student Time Off Task	Percent Teacher Time Lecturing	Avg Percent Student Time being Tested
Reading Gap Reduction	1.00	.42	.36	.34	-.29	-.29
Math Gap Reduction		1.00	.29	.13	-.23	-.51
Avg Percent Student Time, Seatwork			1.00	.20	.15	-.28
Avg Percent Student Time, Off Task				1.00	-.14	.01
Percent Teacher Time, Lecturing					1.00	-0.15
Standard Deviation	1.0	1.0	12.1	2.4	3.5	9.9
Reliability			.80	.79	.80	.80

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TABLE 6

READING GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 2 AND 3

CASE	READING GAP REDUCTION	AVG PERCENT STUDENT TIME IN SEATWORK	AVG PERCENT STUDENT TIME OFF TASK	PERCENT TEACHER TIME LECTURING	AVG PERCENT STUDENT TIME BEING TESTED
1P	1.98	27.2	2.0	0.0	0.0
2P	1.26	37.9	.3	.5	1.6
3P	1.15	49.6	1.9	0.0	0.0
4P	.89	35.7	4.3	0.0	4.3
5P	.63	44.5	.4	3.1	1.7
6P	.52	34.5	4.9	1.4	0.0
7P	.43	45.1	1.0	2.1	0.0
8P	.32	39.7	10.2	0.0	10.5
9P	.02	20.7	0.0	0.0	0.0
10P	-.18	43.9	.1	.6	0.0
11P	-.22	24.0	6.0	2.2	0.0
12P	-.27	39.5	0.0	0.0	0.0
13P	-.31	28.7	0.0	1.0	0.0
14P	-.49	1.4	.1	0.0	0.0
15P	-.51	25.0	2.1	0.0	10.0
16P	-.53	20.1	0.0	0.0	0.0
17P	-.60	32.6	2.4	0.0	0.0
18P	-.70	23.2	.8	0.0	0.0
19P	-.75	37.3	1.4	0.0	0.0
20P	-.80	43.1	1.5	0.0	0.0
21P	-.90	19.8	.8	6.7	0.0
22P	-1.20	15.7	0.0	0.0	5.3
23P	-1.40	45.4	.2	3.7	0.0
24P	-1.40	17.7	0.0	0.0	48.9
25P	-1.40	37.6	0.0	16.7	0.0
26P	-1.40	13.0	0.0	0.0	10.5

TABLE 7

MATHEMATICS GAP REDUCTION AND ASSOCIATED SCHOOL CHARACTERISTICS BY CASE (GRADE WITHIN SCHOOL)

GRADES 2 AND 3

CASE	MATH GAP REDUCTION	AVG PERCENT STUDENT TIME IN SEATWORK	AVG PERCENT STUDENT TIME OFF TASK	PERCENT TEACHER TIME LECTURING	AVG PERCENT STUDENT TIME BEING TESTED
3P	1.96	49.6	1.9	0.0	0.0
12P	1.53	39.5	0.0	0.0	0.0
16P	1.35	20.1	0.0	0.0	0.0
5P	.87	44.5	.4	3.1	1.7
4P	.65	35.7	4.3	0.0	4.3
19P	.64	37.3	1.4	0.0	0.0
2P	.34	37.9	.3	.5	1.6
22P	.34	15.7	0.0	0.0	5.3
8P	.23	39.7	10.2	0.0	10.5
6P	.06	34.5	4.9	1.4	0.0
9P	.03	20.7	0.0	0.0	0.0
17P	.02	32.6	2.4	0.0	0.0
13P	-.04	28.7	0.0	1.0	0.0
7P	-.16	45.1	1.0	2.1	0.0
11P	-.21	24.0	6.0	2.2	0.0
18P	-.26	23.2	.8	0.0	0.0
14P	-.27	1.4	.1	0.0	0.0
21P	-.33	19.8	.8	6.7	0.0
15P	-.62	25.0	2.1	0.0	10.0
10P	-.75	43.9	.1	.6	0.0
20P	-.81	43.1	1.5	0.0	0.0
25P	-1.10	37.6	0.0	16.7	0.0
1P	-1.20	27.2	2.0	0.0	0.0
23P	-1.30	45.4	.2	3.7	0.0
26P	-1.40	13.0	0.0	0.0	10.5
24P	-2.50	17.7	0.0	0.0	48.9